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Amy Wilson Teten

University of Nebraska at Omaha, ateten@unomaha.edu

Shari L. DeVeney

University of Nebraska at Omaha, sdeveney@unomaha.edu

Mary J. Friehe

University of Nebraska at Omaha, mfriehe@unomaha.edu

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Omaha

USE OF STUDENT PERCEPTIONS TO MEASURE VOICE DISORDERS COURSE IMPACT ON LEARNING

Amy F. Teten

University of Nebraska at Omaha

Shari L. DeVeney

University of Nebraska at Omaha

Mary J. Friehe

University of Nebraska at Omaha

Abstract: *Speech-language pathology (SLP) graduate programs offer coursework and clinical training experiences for a wide variety of communication disorder areas. Voice disorders are one area in which many practicing clinicians, particularly school-based practicing clinicians, reportedly feel a lack of professional competency. Many SLP graduate programs offer only limited coursework in voice disorders and limited or no clinical practicum experiences prior to degree completion. The purpose of the present study was to compare the self-perceptions of 45 graduate students majoring in speech-language pathology at the beginning and end of a 3-credit voice disorders course. The Voice Disorders Competency Checklist (Teten, DeVeney, Friehe, 2013) was used as the pre-/post-measurement tool. As anticipated, students reported a higher level of competency following course completion. These self-reported perceptions were seen for the three clusters of knowledge: prevention, assessment, and intervention. Statistical differences were noted between growth in the 'prevention' and the 'assessment' clusters. Directions for future research and practical implications are discussed.*

Introduction

Graduate-level training programs in speech-language pathology are responsible for providing sufficient depth and breadth of curriculum that enable new professionals to provide skilled clinical services for a wide range of communication disorders (American-Speech-Language-Hearing Association, 2014a; Council on Academic Accreditation in Audiology and Speech-Language Pathology, 2013). One such communication disorder that is a part of the required training curriculum is voice disorders. While training programs are not required to offer a course specific to this disorder, students must demonstrate knowledge and clinical skill in treating persons with voice disorders of all ages prior to graduation.

Data collected by the American Speech-Language-Hearing Association (2012, 2014b) documented that only 22% of school-based speech-language pathologists (SLPs) provided special education services to children with voice disorders. The SLPs completing the survey stated they had an average of 1.5 children with a voice disorder on their caseload. This is compared to 92.2% of school SLPs who provided special education services to children with language disorders, which equated to 22.1 children on an average caseload. In a similar study of the adult populations commonly served in medical settings, SLPs estimated that only 6% of their time was spent treating voice disorders compared to 42% of their time with swallowing disorders (i.e., dysphagia) (ASHA, 2013). Despite the fact that voice disorders represent a common communication disorder, access to sufficient course work and clinical training has been cause for concern among SLP training programs (Belandesse & McNamara, 2007).

A common resource for SLP clinical training populations is community-based facilities. Such facilities provide the necessary clinical training with communication disorders that prepares new SLPs for the work force. University-based clinics often are not large enough nor have access to sufficient numbers of clients in all areas of communication disorders. They often rely on the community professionals to facilitate the transfer of knowledge about a communication disorder into the acquisition of professional competencies. Given the caseload data reported above, providing access to the clinical population of voice disorders is likely an area of challenge for many graduate training programs.

Training programs are granted a large degree of flexibility in how curriculum and clinical experiences are designed. Program accreditation is based on the program's ability to demonstrate that knowledge and skills are acquired (CAA, 2013). Locating patients with voice disorders is not the only obstacle for graduate training programs striving to meet the required professional competencies. Unlike other communication disorders, advanced clinical instrumentation is often used during the assessment and treatment of voice disorders. These pieces of voice testing equipment can be quite costly making acquisition of the needed equipment a deterrent to recruiting individuals with voice disorders. In addition, interpretation of the clinical findings generated from the specialized equipment requires specialized training by individuals with expertise in voice disorders. Moreover, the lack of funding for hands-on practice, dedicated space for equipment, and properly training faculty exacerbate the challenges of graduate level SLP training in voice disorders.

Only two studies were found that explored the relationship between type of communication disorder and level of preparation or confidence reported by SLPs. In a survey of school-based SLPs who graduated prior to 2006 and after 2006, Tillard, Lawson, and Emmerson (2011) reported new graduates and their employers perceived voice disorders as one of several communication disorder areas where preparation was weak. When evaluating SLPs' feelings of preparedness and confidence in treating various disorders, Kelly et al. (1997) asked practicing school SLPs to rank-order seven communication disordered populations according to how prepared they felt in treating each area at the time of their clinical training. The population the respondents felt *most* prepared to assess and treat at the conclusion of their training program was assigned a "1." The population the clinicians felt *least* prepared to assess and treat at the end of their training program was assigned a "7." Levels of reported preparedness ranged from 1.18 (most competent) to 5.18 (least competent). Voice disorders had a mean ranking of 4.67 which represented a lower level of preparedness than another population for which training access is limited, fluency disorders (i.e., stuttering) ($M = 4.37$). When asked to rank order the populations according to their current level of preparedness, SLPs reported preparedness for voice disorders and fluency disorders did not change between time of program completion and time of participation in the study.

Given the difficulty in providing students with clinical experiences in voice disorders, it is necessary for training programs to maximize learning in the classroom. In order to quantify students' perceptions of competence in working with clients with voice disorders, the authors compiled the Checklist for Voice and Voice Disorders (Teten et al., 2013)

As fluency disorders represent another area in which SLPs report relatively low levels of preparedness and confidence, research has been completed to examine students' self-perceptions of competence immediately following fluency disorders coursework. Klein and Amster (2010) utilized the Fluency and Fluency Disorders Checklist of Competencies for Assessment and Treatment of Stuttering (Gottwald, Amster, & LaSalle, 2010) as both a pre- and post-test measure of student self-perception. The authors found that students reported increased self-perceptions of competence regarding their ability to evaluate and treat persons exhibiting fluency disorders at the end of their coursework in the area.

Typically, instructors providing course work in communication disorders rely on a combination of traditional lectures, webinars, therapy simulations, and assignments focused on case-based learning. Because access to clinical experiences may be restricted for many graduate training programs, the authors hypothesized that students would report higher levels of perceived competence following course work. Although information regarding the latter is presently unavailable, the authors sought to determine the changes in student self-perception of competence in a 3-credit voice disorders course in order to facilitate the ease of future comparisons.

The purpose of the present study was to compare student self-perceptions of their competency in voice disorders at the beginning and end of a 3-credit voice disorders course. Further determination was made regarding the students' degree of change within specific areas of voice disorders such as competencies related to prevention, assessment, and treatment. The following research questions were addressed:

1. Is there a significant overall change between student self-perception of competence in voice disorders between the beginning and end of a 3-credit course in voice disorder content?
2. Are there significant patterns of perceived strengths/weaknesses (e.g., prevention, assessment, treatment issues) for student self-perceptions of competence in voice disorders between the beginning and end of a 3-credit course in voice disorder content?

Methods

Participants. Study participants included 47 graduate students majoring in speech-language pathology (SLP) at a Midwest program accredited by the Council for Academic Accreditation in Audiology and Speech-Language Pathology. Since two did not complete the post-test, data analysis was completed on only 45 students. All were enrolled in a graduate course on voice disorders over a period of two semesters (2013-2014). Overall, there were 43 females and two males. Class size ranged from a low of 18 to a high of 27 (mean=23.5). For the 2013 cohort, there were 18 students (17 females; 1 male) and, for the 2014 cohort, there were 27 students (26 females; 1 male).

Instrumentation. The Voice Disorders Competency Checklist requested participants to rate themselves on a 25-item checklist of competencies related to voice disorders. The checklist was created by the researchers (see Teten et al., 2013) and is comprised of competencies relating to normal development and prevention, assessment, and intervention skills in the area of voice disorders. The self-ratings involved a 1-5 Likert type scale with 1 being Minimally Competent and 5 Extremely Competent.

Procedures. The authors' university Institutional Review Board approved all procedures involved in this study. Participants were asked to complete the Voice Disorders Competency Checklist (Teten et al., 2013) on the first and last day of class (see Table 1). A measure of internal consistency regarding the checklist found a Cronbach's alpha (α) was 0.974, indicating a high level of internal consistency.

The instructor for both voice disorders courses was the same, an assistant professor in speech-language pathology who holds the certificate of clinical competence in speech-language pathology (CCC-SLP). The instructor maintained the same teaching methods, required readings, assignments, and exams across the two course sections.

Table 1. Pretest descriptive data for items 1-25, students' self-perceived levels of competence in assessing and treating voice disorders

| | <i>Item</i> | <i>M</i> | <i>SD</i> | <i>Minimally Competent n/%</i> | <i>Somewhat competent n/%</i> | <i>Moderately Competent n/%</i> | <i>Very Competent n/%</i> | <i>Extremely Competent n/%</i> |
|----|--|----------|-----------|--|---------------------------------------|---|-----------------------------------|--|
| 1. | Identifies normal voice by describing pitch, loudness, quality, and resonance | 2.29 | .89 | 9/20 | 18/40 | 14/31.1 | 4/8.9 | 0/0 |
| 2. | Develops preventative strategies for maintenance of vocal wellness | 2.18 | .91 | 12/26.7 | 16/35.5 | 14/31.1 | 3/6.7 | 0/0 |
| 3. | Obtains a comprehensive case history by documenting information about psychological, psychosocial, developmental, occupational, medical, pharmacological, behavioral, and cultural variables that may influence voice. | 1.82 | .91 | 20/44.4 | 16/35.6 | 6/13.3 | 3/6.7 | 0 |
| 4. | Collects representative voice samples in order to perform auditory-perceptual evaluations of roughness, breathiness, strain, pitch, loudness, and overall severity of the voice. | 1.42 | .72 | 31/68.9 | 10/22.2 | 3/6.7 | ½/2 | 0/0 |
| 5. | Considers environmental variables (e.g., emotional reactions, social pressures) that may impact the severity of the voice disorder through hierarchical analysis. | 2.24 | .86 | 8/17.8 | 22/48.9 | 11/24.4 | 4/8.9 | 0/0 |
| 6. | Utilizes available and appropriate non-instrumental and/or instrumental diagnostic measures (e.g., physiological, acoustic, aerodynamic, and auditory-perceptual) to assess voice. | 1.2 | .46 | 37/82.2 | 7/15.6 | 1/2.2 | 0/0 | 0/0 |
| 7. | Differentiates between etiologies of voice disorders (e.g., Muscle tension dysphonia [MTD] vs. organic vs. neurogenic vs. psychogenic) in order to make appropriate referrals and/or treatment decisions. | 1.36 | .48 | 29/64.4 | 16/35.6 | 0/0 | 0/0 | 0/0 |
| 8. | Identifies and describes anatomical/physiological | 1.64 | .68 | 21/46.7 | 19/42.2 | 5/11.1 | 0/0 | 0/0 |

| | | | | | | | | |
|-----|--|------|-----|---------|---------|---------|-------|-------|
| | sources of hyper- or hypo-function as they relate to voice disorders. | | | | | | | |
| 9. | Attends to the needs, cultural values, gender role, and linguistic background of the client and relevant family members when performing assessments and/or interventions for voice disorders. | 2.53 | .81 | 5/11.1 | 15/33.3 | 21/46.7 | 4/8.9 | 0/0 |
| 10. | Considers the development and/or maintenance of voice disorders in a broader context that includes the potential presence of concomitant communication disorders such as motor speech and/or language disorders. | 1.71 | .79 | 21/46.7 | 17/37.8 | 6/13.3 | 1/2.2 | 0/0 |
| 11. | Integrates developmental vocal milestones (and/or expected changes) through the lifespan when assessing for voice disorders. | 1.51 | .69 | 26/57.8 | 16/35.6 | 2/4.4 | 1/2.2 | 0/0 |
| 12. | Displays flexibility in selecting appropriate facilitating voice techniques when assessing the client's stimulability for improved vocal quality at the time of the initial evaluation and during ongoing treatment. | 1.29 | .55 | 34/75.6 | 9/20 | 2/4.4 | 0/0 | 0/0 |
| 13. | Plans and implements a treatment program to address the individual needs of the client and communication styles of family members based on the results of comprehensive assessment and client and/or family consultation | 1.71 | .92 | 23/51.1 | 15/33.3 | 5/11.1 | 1/2.2 | 1/2.2 |
| 14. | Clearly and effectively conveys information to clients and/or their family members regarding a variety of therapeutic choices and their evidence base. | 1.78 | .95 | 22/48.9 | 14/31.1 | 7/15.6 | 1/2.2 | 1/2.2 |
| 15. | Demonstrates various therapeutic strategies for facilitating the restoration of normal balance between respiration, phonation, and resonance to achieve a natural sounding voice. | 1.23 | .56 | 37/82.3 | 6/33.3 | 2/4.4 | 0/0 | 0/0 |
| 16. | Considers implementation of several different procedures to facilitate maintenance and generalization of vocal improvements achieved in the clinical setting. | 1.33 | .60 | 33/73.3 | 9/20 | 3/6.7 | 0/0 | 0/0 |
| 17. | Recognizes procedures for implementing use of speaking valves with tracheostomized patients. | 1.29 | .63 | 36/80 | 5/11.1 | 4/8.9 | 0/0 | 0/0 |
| 18. | Identifies and demonstrates (or instructs) various modalities of communication for alaryngeal individuals. | 1.31 | .63 | 35/77.8 | 6/13.3 | 4/8.9 | 0/0 | 0/0 |
| 19. | Demonstrates knowledge of tracheo-esophageal voice prosthesis management, hygiene, and placement procedures. | 1.24 | .57 | 37/82.2 | 5/11.1 | 3/6.7 | 0/0 | 0/0 |
| 20. | Assists clients in developing and adhering to a plan for managing vocal hygiene over time. | 1.71 | .79 | 22/48.9 | 14/31.1 | 9/20 | 0/0 | 0/0 |
| 21. | Uses appropriate counseling skills to adequately attend to client and family feelings, attitudes, and coping strategies. | 2.6 | .91 | 5/11.1 | 14/31.1 | 22/49 | 2/4.4 | 2/4.4 |
| 22. | Demonstrates understanding of the roles of various professionals on the voice team and makes appropriate referrals to other professionals as needed. | 1.64 | .74 | 23/51.1 | 15/33.3 | 7/15.6 | 0/0 | 0/0 |
| 23. | Writes evaluation, therapy, and referral reports that adequately explain the nature of the client's voice disorder and its treatment for the client and family. | 1.33 | .60 | 32/71.1 | 12/26.7 | 0/0 | 1/2.2 | 0/0 |
| 24. | Communicates ethical and professional issues inherent in providing services to individuals with voice disorders. | 1.82 | .81 | 18/40 | 18/40 | 8/17.8 | 1/2.2 | 0/0 |
| 25. | Recognizes the potential handicapping nature of | 2.02 | .81 | 12/26.7 | 22/48.9 | 9/20 | 2/4.4 | 0/0 |

the voice disorder and educates client and/or relevant family members accordingly.

Results

Descriptive and inferential statistics were used to address the first research question, which investigated student self-perceptions of their voice disorder competencies at the beginning and end of the 3-credit course in voice disorder content. For pre-/post-test item mean scores with standard deviations, see Tables 1-3. The IBM SPSS software program (version 22) was used for all inferential statistical analyses. The two course section cohorts were not initially equivalent for pre-test scores. Homogeneity of variances, as assessed by Levene's test of homogeneity of variance was not present for pre-course measures ($p < .005$), but was present for post-course measures ($p = .163$). Homogeneity of covariances as assessed by Box's test of equality of covariance matrices ($p = .030$), was not present. Although homogeneity of the two student cohorts was not established before combining the groups for further analysis; this initial assumption failure is difficult to remedy. The authors wanted to note the violation for this initial assumption and acknowledge the resulting increased risk of a Type I error, but conducted the mixed Analysis of Variance (ANOVA), as is typical procedure, in order to determine whether there were differences between pre- and post-measurements across student participants. Overall, there was a statistically significant effect of voice disorder course completion on student self-perceptions of voice disorder competencies, $F(1, 43) = 654.565$, $p < 0.005$, partial $\eta^2 = .938$. However, between cohort differences were not significant for post-measure outcomes, $F(1, 43) = 0.871$, $p = 0.356$, partial $\eta^2 = 0.020$.

Table 2. Post-test descriptive data for items 1-25, students' self-perceived levels of competence in assessing and treating voice disorders

| | <i>Item</i> | <i>M</i> | <i>SD</i> | <i>Minimally Competent n/%</i> | <i>Somewhat Competent n/%</i> | <i>Moderately Competent n/%</i> | <i>Very Competent n/%</i> | <i>Extremely Competent n/%</i> |
|----|--|----------|-----------|--|---------------------------------------|---|-----------------------------------|--|
| 1. | Identifies normal voice by describing pitch, loudness, quality, and resonance | 3.93 | .54 | 0/0 | 0/0 | 8/17.8 | 32/71.1 | 5/11.1 |
| 2. | Develops preventative strategies for maintenance of vocal wellness | 4.27 | .65 | 0/0 | 0/0 | 5/11.1 | 23/51.1 | 17/37.8 |
| 3. | Obtains a comprehensive case history by documenting information about psychological, psychosocial, developmental, occupational, medical, pharmacological, behavioral, and cultural variables that may influence voice. | 3.96 | .77 | 0/0 | 1/2.2 | 11/24.4 | 22/48.9 | 1/24.4 |
| 4. | Collects representative voice samples in order to perform auditory-perceptual evaluations of roughness, breathiness, strain, pitch, loudness, and overall severity of the voice. | 3.69 | .63 | 0/0 | 0/0 | 18/40 | 23/51.1 | 4/8.9 |
| 5. | Considers environmental variables (e.g., emotional reactions, social pressures) that may impact the severity of the voice disorder through hierarchical analysis. | 4.14 | .65 | 0/0 | 0/0 | 7/15.6 | 25/55.6 | 13/28.8 |
| 6. | Utilizes available and appropriate non-instrumental and/or instrumental diagnostic measures (e.g., physiological, acoustic, aerodynamic, and auditory-perceptual) to assess voice. | 3.56 | .72 | 0/0 | 3/6.7 | 17/37.8 | 22/48.8 | 3/6.7 |
| 7. | Differentiates between etiologies of voice disorders (e.g., Muscle tension dysphonia [MTD] vs. organic vs. neurogenic vs. psychogenic) in order to make appropriate referrals and/or treatment decisions. | 3.9 | .64 | 0/0 | 1/2.2 | 9/20 | 29/64.5 | 6/13.3 |
| 8. | Identifies and describes anatomical/physiological sources of hyper- or hypo-function as they relate to voice disorders. | 3.86 | .55 | 0/0 | 0/0 | 11/24.4 | 30/66.7 | 6/13.3 |
| 9. | Attends to the needs, cultural values, gender role, and linguistic background of the client and relevant family members when performing assessments and/or | 4.2 | .63 | 0/0 | 0/0 | 5/11.1 | 26/57.8 | 14/31.1 |

| | | | | | | | | |
|-----|--|------|-----|-----|-------|---------|---------|---------|
| | interventions for voice disorders. | | | | | | | |
| 10. | Considers the development and/or maintenance of voice disorders in a broader context that includes the potential presence of concomitant communication disorders such as motor speech and/or language disorders. | 3.66 | .56 | 0/0 | 0/0 | 18/40 | 25/55.6 | 2/4.4 |
| 11. | Integrates developmental vocal milestones (and/or expected changes) through the lifespan when assessing for voice disorders. | 3.68 | .67 | 0/0 | 1/2.2 | 17/37.8 | 23/51.1 | 4/8.9 |
| 12. | Displays flexibility in selecting appropriate facilitating voice techniques when assessing the client's stimulability for improved vocal quality at the time of the initial evaluation and during ongoing treatment. | 3.97 | .63 | 0/0 | 0/0 | 10/22.2 | 27/60 | 8/17.8 |
| 13. | Plans and implements a treatment program to address the individual needs of the client and communication styles of family members based on the results of comprehensive assessment and client and/or family consultation | 3.74 | .59 | 0/0 | 1/2.2 | 12/26.7 | 30/66.7 | 2/4.4 |
| 14. | Clearly and effectively conveys information to clients and/or their family members regarding a variety of therapeutic choices and their evidence base. | 3.8 | .69 | 0/0 | 0/0 | 16/35.6 | 22/48.8 | 7/15.6 |
| 15. | Demonstrates various therapeutic strategies for facilitating the restoration of normal balance between respiration, phonation, and resonance to achieve a natural sounding voice. | 3.73 | .62 | 0/0 | 0/0 | 16/35.6 | 25/55.5 | 4/8.9 |
| 16. | Considers implementation of several different procedures to facilitate maintenance and generalization of vocal improvements achieved in the clinical setting. | 3.76 | .61 | 0/0 | 0/0 | 15/33.3 | 26/57.8 | 4/8.9 |
| 17. | Recognizes procedures for implementing use of speaking valves with tracheostomized patients. | 3.44 | .70 | 0/0 | 3/6.7 | 21/46.7 | 19/42.2 | 2/4.4 |
| 18. | Identifies and demonstrates (or instructs) various modalities of communication for alaryngeal individuals. | 3.86 | .73 | 0/0 | 1/2.2 | 13/28.9 | 23/51.1 | 8/17.8 |
| 19. | Demonstrates knowledge of tracheo-esophageal voice prosthesis management, hygiene, and placement procedures. | 3.71 | .82 | 0/0 | 3/6.7 | 14/31.1 | 21/46.6 | 7/16.6 |
| 20. | Assists clients in developing and adhering to a plan for managing vocal hygiene over time. | 4.21 | .59 | 0/0 | 0/0 | 4/8.9 | 28/62.2 | 13/28.9 |
| 21. | Uses appropriate counseling skills to adequately attend to client and family feelings, attitudes, and coping strategies. | 4.19 | .65 | 0/0 | 0/0 | 6/13.3 | 25/55.6 | 14/31.1 |
| 22. | Demonstrates understanding of the roles of various professionals on the voice team and makes appropriate referrals to other professionals as needed. | 4.02 | .70 | 0/0 | 0/0 | 10/22.2 | 24/53.3 | 11/24.5 |
| 23. | Writes evaluation, therapy, and referral reports that adequately explain the nature of the client's voice disorder and its treatment for the client and family. | 3.42 | .61 | 0/0 | 2/4.4 | 24/53.4 | 18/40 | 1/2.2 |
| 24. | Communicates ethical and professional issues inherent in providing services to individuals with voice disorders. | 3.96 | .60 | 0/0 | 0/0 | 9/20 | 29/64.4 | 7/15.6 |
| 25. | Recognizes the potential handicapping nature of the voice disorder and educates client and/or relevant family members accordingly. | 4.29 | .59 | 0/0 | 0/0 | 3/6.7 | 26/57.8 | 16/35.5 |

Table 3. Pre- and post-measure means and standard deviations for all students

| Item | Pre | | Post | |
|--|------|-----|------|-----|
| | M | SD | M | SD |
| 1. Identifies normal voice by describing pitch, loudness, quality, and | 2.29 | .89 | 3.93 | .54 |

| | | | | | |
|-----------|--|------|-----|------|-----|
| Resonance | | | | | |
| 2. | Develops preventative strategies for maintenance of vocal wellness | 2.18 | .91 | 4.27 | .65 |
| 3. | Obtains a comprehensive case history by documenting information about psychological, psychosocial, developmental, occupational, medical, pharmacological, behavioral, and cultural variables that may influence voice. | 1.82 | .91 | 3.96 | .77 |
| 4. | Collects representative voice samples in order to perform auditory-perceptual evaluations of roughness, breathiness, strain, pitch, loudness, and overall severity of the voice. | 1.42 | .72 | 3.69 | .63 |
| 5. | Considers environmental variables (e.g., emotional reactions, social pressures) that may impact the severity of the voice disorder through hierarchical analysis. | 2.24 | .86 | 4.14 | .65 |
| 6. | Utilizes available and appropriate non-instrumental and/or instrumental diagnostic measures (e.g., physiological, acoustic, aerodynamic, and auditory-perceptual) to assess voice. | 1.2 | .46 | 3.56 | .72 |
| 7. | Differentiates between etiologies of voice disorders (e.g., Muscle tension dysphonia [MTD] vs. organic vs. neurogenic vs. psychogenic) in order to make appropriate referrals and/or treatment decisions. | 1.36 | .48 | 3.9 | .64 |
| 8. | Identifies and describes anatomical/physiological sources of hyper- or hypo-function as they relate to voice disorders. | 1.64 | .68 | 3.86 | .55 |
| 9. | Attends to the needs, cultural values, gender role, and linguistic background of the client and relevant family members when performing assessments and/or interventions for voice disorders. | 2.53 | .81 | 4.2 | .63 |
| 10. | Considers the development and/or maintenance of voice disorders in a broader context that includes the potential presence of concomitant communication disorders such as motor speech and/or language disorders. | 1.71 | .79 | 3.66 | .56 |
| 11. | Integrates developmental vocal milestones (and/or expected changes) through the lifespan when assessing for voice disorders. | 1.51 | .69 | 3.68 | .67 |
| 12. | Displays flexibility in selecting appropriate facilitating voice techniques when assessing the client's stimulability for improved vocal quality at the time of the initial evaluation and during ongoing treatment. | 1.29 | .55 | 3.97 | .63 |
| 13. | Plans and implements a treatment program to address the individual needs of the client and communication styles of family members based on the results of comprehensive assessment and client and/or family consultation | 1.71 | .92 | 3.74 | .59 |
| 14. | Clearly and effectively conveys information to clients and/or their family members regarding a variety of therapeutic choices and their evidence base. | 1.78 | .95 | 3.8 | .69 |
| 15. | Demonstrates various therapeutic strategies for facilitating the restoration of normal balance between respiration, phonation, and resonance to achieve a natural sounding voice. | 1.23 | .56 | 3.73 | .62 |
| 16. | Considers implementation of several different procedures to facilitate maintenance and generalization of vocal improvements achieved in the clinical setting. | 1.33 | .60 | 3.76 | .61 |
| 17. | Recognizes procedures for implementing use of speaking valves with tracheostomized patients. | 1.29 | .63 | 3.44 | .70 |
| 18. | Identifies and demonstrates (or instructs) various modalities of communication for alaryngeal individuals. | 1.31 | .63 | 3.86 | .73 |
| 19. | Demonstrates knowledge of tracheo-esophageal voice prosthesis management, hygiene, and placement procedures. | 1.24 | .57 | 3.71 | .82 |
| 20. | Assists clients in developing and adhering to a plan for managing vocal hygiene over time. | 1.71 | .79 | 4.21 | .59 |
| 21. | Uses appropriate counseling skills to adequately attend to client and family feelings, attitudes, and coping strategies. | 2.6 | .91 | 4.19 | .65 |
| 22. | Demonstrates understanding of the roles of various professionals on the voice team and makes appropriate referrals to other professionals as needed. | 1.64 | .74 | 4.02 | .70 |
| 23. | Writes evaluation, therapy, and referral reports that adequately explain the nature of the client's voice disorder and its treatment for the client and family. | 1.33 | .60 | 3.42 | .61 |
| 24. | Communicates ethical and professional issues inherent in providing services to individuals with voice disorders. | 1.82 | .81 | 3.96 | .60 |
| 25. | Recognizes the potential handicapping nature of the voice disorder and educates client and/or relevant family members accordingly. | 2.02 | .81 | 4.29 | .59 |

Question two addressed the significant patterns of perceived strengths / weaknesses (e.g., prevention, assessment, treatment issues) for students' self-perceptions of competence in voice disorders. To answer this research question, individual competency survey items were grouped into three 'clusters' of similarly themed

response items. These included the following: a) items primarily related to prevention (items 1-2; 10-11), b) items primarily related to assessment (items 3-9; 12), and c) items primarily related to issues of treatment (items 13-25). The pre-/post-test means for each cluster were as follows: Prevention (pre- $M = 1.92$, post- $M = 3.88$), Assessment (pre- $M = 1.69$; post- $M = 3.91$), and Treatment (pre- $M = 1.62$, post- $M = 3.86$). For each item, a difference score was calculated for each student (i.e., post-test score - pre-test score = difference or “growth” score). The growth scores were then averaged for each cluster.

A Friedman test was conducted to determine if there were differences in the cluster growth scores (prevention, assessment, and treatment of voice disorders) from the beginning and end of a 3-credit course in voice disorders. Student self-perceived growth in competence was statistically significantly different between the different clusters, $\chi^2(2) = 9.910$, $p = .007$. Pairwise comparisons were performed with a Bonferroni correction for multiple comparisons. Student self-perceived growth in the prevention cluster (Mean rank = 1.66) was significantly different than growth in the assessment cluster (Mean rank = 2.31; $p < .002$). No other pairwise comparisons between cluster groups were significant.

Discussion

The purpose of this study was to determine the effectiveness of a 3-credit, graduate course in voice disorders and examine patterns of strengths and weaknesses in specific clusters of competencies of voice disorders based on self-report by the students. The research is somewhat unique in that no reports were found documenting course effectiveness using student self-perceptions for this particular area of voice disorders. Both groups of students exhibited higher perceptions of competence at post-test. The majority of items, 72%, were rated as ‘moderately competent’ at the completion of the course. For the remaining seven items, students rated themselves as ‘very competent.’ This supports the findings of Klein and Amster (2010) who found that learning in another communication disorder area, fluency disorders, was improved as a result of completing a course dedicated to that topic. These authors also found that the Fluency and Fluency Disorders Checklist of Competencies for Assessment and Treatment of Stuttering (Gottwald et al., 2010) was sensitive to documenting improvements in perceptions of competence.

One might anticipate the finding that students felt most competent in identifying and preventing voice disorders at the beginning of the class and less competent in assessment and intervention. In part this could be due to the fact that students bring to specialty disorder classes an accumulation of introductory and generalizable information concerning topics such as types of disorders, general characteristics, and routine prevention measures for communication disorders. When it came to looking at the development of knowledge regarding voice disorders in relationship to other communication disorders, most students did not report existing knowledge or competency in assessment procedures specific to a disorder, decision-making strategies, and disorder-specific intervention activities. Unless students have been involved in assisting with a client displaying a voice disorder or participating in simulated case activities with voice disorders, their in-depth knowledge and skills in assessment and intervention should be limited. This assumption was only partially confirmed by the present study findings in which participants’ self-reported perceptions of growth across the course were only significantly different between the prevention and assessment clusters, not treatment.

When examining the students’ assessment competencies, their ratings were highest for integrating social, cultural, and gender relevance into their diagnostics for voice disorders. They also felt competent in developing voice wellness programs as a preventative strategy and counseling clients and families. Again, these assessment topics often involve principles and practices that cut across many communication disorders as opposed to being disorder specific. Individual skills that students felt least competent with were use of non-instrumental and instrumental diagnostic measures, report writing, and implementation of voice disorder-specific intervention incorporating speaking valves with tracheostomized clients.

Overall, students indicated improved self-perceived competence in voice disorders content after completion of a 3-credit course. These findings of student self-perception upon the immediate completion of a coursework in the area are in contrast to findings indicated by Tillard et al. (2011) and Kelly et al. (1997) at later stages of career development. Both research groups’ findings indicated voice disorders as a content area of relative weakness for new graduates and practicing school-based SLPs. It is disheartening to note that Kelly et al. (1997) noted SLPs’ perceived preparedness for voice disorder decreased over time after graduate training completion. The present study findings indicated that as students, many SLPs report some feelings of competence in the area. More research is needed to determine at which point these feelings of competence begin to decline for most SLPs to develop preventative or remedial measures the profession could implement in order to slow or reverse this progression.

Limitations and future directions. Several limitations should be considered prior to generalization of the present study results. The first is that the two student cohorts, one from 2013 and one from 2014, were not homogeneous before being combined for statistical comparison. Significant differences between the two cohorts in their initial competency ratings indicates that the study be replicated with larger groups of students or more classes in order to definitively rule out the risk of a Type 1 error, noting the presence of a significant difference when one does not exist (see Orlikoff, Schiavetti, & Metz, [2015] for a more extended discussion of Type 1 error risks). It would be of interest to explore why the student cohort pre-test scores were different. Participant information on prior clinical exposure to or experiences with voice disorders was not collected, although typical practice is to delay assigning clientele exhibiting any disorder type until after students have completed the appropriate coursework. Students who were early in their graduate program when enrolled in the voice disorders course, perhaps as a first semester graduate student, may not perform the same as later in their program when they have taken more disorder-specific content courses and participated in a variety of basic clinical experiences. Replication with other disorder-content courses would lend additional support for this research. In addition, replication with voice disorder courses for varying course credit values (e.g., 1-credit and 2-credit) for future comparison would be advantageous.

Another limitation was the inclusion of clusters as a way to measure growth of student competencies. While there were differences between the clusters, a factor analysis was not completed nor had the clusters been used before. This would add to the psychometric value of the competency checklist.

A third limitation is that no data was collected to examine changes in self-perceived competencies post-degree completion. Perhaps a follow-up study that compared student competencies after they had provided treatment for individuals with voice disorders could reveal if the post course competencies were related to the students' actual transfer of knowledge to skills in a clinical setting. Finally, indications of faculty impressions regarding student-learning outcomes would enhance the interpretation of the present study findings.

Suggested extensions of the present study include using replication with voice disorders courses offered for varying amounts of credit (e.g., 1-credit, 2-credit) as well as collecting a larger sample from which to draw conclusions regarding the 3-credit course outcomes. Using similar pre-/post- self-perceived competence checklists in other disorder content courses such as the fluency disorder competence checklist created by Gottwald et al. (2010) to determine student learning growth in other areas of interest to the field.

Conclusion

The use of a self-rating scale for evaluating student learning in a voice disorders course is a quick and effective way to measure overall competency growth. The self-rating scale was sensitive enough to document differences between the groups at the beginning of the semester, show growth over the semester, and indicate significant differences in growth across cluster areas. Instructors may consider developing similar self-rating scales for other communication disorder areas to complement traditional course projects or exams used to measure student learning.

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Amy Teten, Ph.D., CCC-SLP is an Assistant Professor at the University of Nebraska at Omaha. She holds an undergraduate degree in music therapy with an emphasis in voice performance from Florida State University and a Ph.D. in Communication Sciences and Disorders from the University of South Alabama.

Shari DeVeney, Ph.D., CCC-SLP, is an Assistant Professor at the University of Nebraska at Omaha. She completed her undergraduate degree at the University of Nebraska-Lincoln (UNL), Masters at Kansas State University, and doctorate degree at UNL. She has been a practicing speech-language pathologist for over 10 years.

Mary Friehe, Ph.D., CCC-SLP is a Professor at the University of Nebraska at Omaha. She serves as Program Director and specializes in school-age language disorders. As a former member of the Council on Academic Accreditation in Audiology and Speech-Language Pathology, she maintains an interest in curriculum development.